INCH-POUND

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SUPERSEDING
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MILITARY SPECIFICATION

CAPACITORS, VARIABLE, CERAMIC DIELECTRIC, GENERAL SPECIFICATION FOR

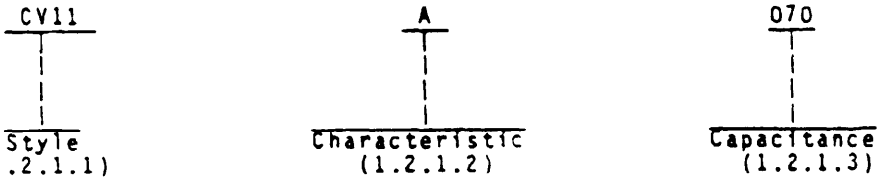
This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for ceramic dielectric, variable capacitors intended for operation over a temperature range of -55 C to +85 C, for use in circuits where periodic adjustments are required (see 6.1.).

1.2 Classification.

1.2.1 Type designation. The type designation shall be in the following form, and as specified (see 3.1 and 6.2):



1.2.1.1 Style. The style is identified by the two-letter symbol "CV" followed by a two-digit number; the letters identify ceramic dielectric, variable capacitors and the number identifies the shape and dimensions of the capacitor.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Air Force Logistics Command, 2750 ABW/ES, Gentile Air Force Station, Dayton, Oh 45444-4500 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A
FSC 5910

1.2.1.2 Characteristic. The characteristic is identified by a single letter in accordance with table I.

TABLE I. Characteristics.

Symbol	Capacitance change from value at 25°C					
	At -55°C		At +85°C		At +125°C	
	Minimum	Maximum	Minumum	Maximum	Minimum	Maximum
	Percent	Percent	Percent	Percent	Percent	Percent
A	-4.5	+2.0	-2.5	+2.0	-4.2	+3.4
B	-1.0	+3.5	-2.5	-0.5	-4.2	-0.8
C	-1.0	+6.5	-4.0	-1.0	-6.7	-1.7
D	+1.5	+7.0	-5.0	-1.5	-8.5	-2.5
E	+3.0	+14.0	-10.0	-3.0	-15.0	-9.0
G	0.0	+14.0	-8.0	-3.0	-14.0	-5.0
	Temperature coefficient -55°C to +85°C					
F	+100	±150	ppm/°C			
H	+100	±600	"			
J	-300	±300	"			
K	-450	±300	"			
L	+ 50	±150	"			
M	-100	±500	"			
N	-300	±800	"			
P	-400	±500	"			
Q	-1500	±900	"			
R	-200	±400	"			
T	-150	±300	"			
V	-1200	±500	"			
W	0	±400	"			
X	0	±200	"			
Y	-450	±300	"			
Z	-750	±300	"			

1.2.1.3 Capacitance. The nominal maximum rated capacitance value expressed in picofarads (pF) is identified by a three-digit number; the first two digits represent significant figures and the last digit specifies the number of zeros to follow. When fractional values are required, the letter "R" shall be used to indicate the decimal point. For example: 2R5 indicates 2.5 pF.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

MILITARY

MIL-C-39028 - Capacitors, Packaging of.

(See supplement 1 for list of associated specification sheets.)

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
MIL-STD-45662 - Calibration Systems Requirements.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. Capacitors furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time of award of contract (see 4.4 and 6.3).

3.3 Material. The material shall be as specified herein. When a definite material is not specified, a material which will enable the capacitors to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

3.4 Design and construction. Capacitors shall be of the design, construction, and physical dimensions specified (see 3.1).

3.5. Dielectric withstanding voltage. When measured as specified in 4.6.2, capacitors shall withstand the direct current (dc) potential without damage, breakdown, or flashover.

3.6 Barometric pressure (reduced). When measured as specified in 4.6.3, capacitors shall withstand the dc potential without breakdown or flashover.

3.7 Insulation resistance. When measured as specified in 4.6.4, the insulation resistance of the capacitors shall be not less than 10,000 megohms.

3.8 Capacitance. When measured as specified in 4.6.5, the minimum capacitance shall be no greater than the minimum value specified and the maximum capacitance shall be not less than the maximum value specified, and no greater than 50 percent above the maximum value specified (see 3.1).

3.9 Dissipation factor. When measured as specified in 4.6.6, the dissipation factor of capacitors shall be not more than 0.2 percent.

3.10 Temperature coefficient and capacitance drift.

3.10.1 Temperature coefficient. When measured as specified in 4.6.7.1, capacitance-change measurements shall be within the limits specified in table I for the applicable characteristic.

3.10.2 Capacitance drift (for qualification only). When calculated as specified in 4.6.7.2, capacitance drift shall be within 0.50 picofarad of the initial step 1 measurement.

3.11 Terminal strength. When measured as specified in 4.6.8, there shall be no fracture, loosening of parts, or other mechanical failures.

3.12 Torque. When measured as specified in 4.6.9, the torque values shall be within the limits specified for individual capactior styles (see 3.1).

3.13 Fatigue. When measured as specified in 4.6.10, capacitors shall meet the following requirements:

Capacitance - - - - - - - - -	Change not more than 12 percent or 0.75 picofarad, whichever is greater, from the initial value obtained when measured as specified in 4.6.10.
Torque - - - - - - - - - - -	As specified for individual capacitor styles (see 3.1).

3.14 Life. When tested as specified in 4.6.11, capacitors shall meet the following requirements:

Insulation resistance - - -	As specified in 3.7.
Capacitance - - - - - - - - -	Unless otherwise specified, change not more than 5 percent or 0.50 picofarad, whichever is greater, from the initial value obtained when set and measured as specified in 4.6.11.1.

3.15 Shock, specified pulse. When capacitors are tested as specified in 4.6.12, there shall be no intermittent contacts of 0.5 millisecond (ms) or greater duration or arcing or other indication of breakdown, nor shall there be any open or short circuiting or evidence of mechanical damage.

3.16 Vibration, high frequency. When capacitors are tested as specified in 4.6.13, there shall be no intermittent contacts of 0.5 millisecond (ms) or greater duration or arcing or other indication of breakdown, nor shall there be any open or short circuiting or evidence of mechanical damage. Capacitors shall also meet the following requirements:

Capacitance	Change not more than 2 percent or 0.5 pF (0.25 pF for values less than 10 pF), whichever is greater, from the initial value obtained when measured as specified in 4.6.5.
Dissipation factor	Not more than 0.2 percent.
Dielectric withstanding voltage	As specified in 3.5.

3.17 Moisture resistance. When measured as specified in 4.6.14, capacitors shall meet the following requirements:

Visual inspection	There shall be no mechanical damage.
Insulation resistance	Shall exceed 10,000 megohms.
Capacitance	Change not more than 10 percent for styles CV11, CV14, and CV21, and not more than 5 percent for styles CV31 and CV34 from the initial value obtained when set and measured as specified in 4.6.5.
Dissipation factor	Shall not be more than 0.5 percent.

3.18 Marking. Each capacitor shall be legibly marked with smear-resistant ink that will withstand the environmental tests specified herein and shall be marked with the type designation, and the manufacturer's name or symbol. The marking shall not be placed on the mounting surface. There shall be no space between the symbols which comprise the type designation. If lack of space requires it, the type designation may appear on two lines. In this event, the type designation shall be divided between the style and the characteristic symbols and shall appear on two lines as shown in the following example:

CV11
A070

Other markings which in any way interfere with, obscure, or confuse those specified herein, are prohibited. Marking shall remain legible after all tests.

3.19 Workmanship. Capacitors shall be manufactured and processed in a careful and workmanlike manner in accordance with good design and good practice.

3.19.1 Soldering. Flux for soldering shall be rosin or rosin and alcohol. No acid or acid salts shall be used in preparation for or during soldering; however, exception is permitted for preliminary tinning of electrical connections and for tinning or soldering of mechanical joints not used to complete electrical circuits, but in no case shall acid or acid salts be used where they can come in contact with insulation material, unless they are removed in the processing. Where acid or acid salts are used, as permitted above, they shall be completely neutralized and removed immediately after use. All excess solder shall be removed. Where possible, electrical connections shall be mechanically secure before soldering and electrically continuous after soldering. The inclusion of silver in tin-lead solder is recommended to counteract alloying effects with the plating on the dielectric.

3.19.2 Finish of terminals. The terminals shall be so coated that soldering can be accomplished readily.

4. QUALITY ASSURANCE PROVISION

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections. The examination and testing of capacitors shall be classified as follows:

a. Qualification inspection (see 4.4).

b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3), on sample units produced with equipment and procedures normally used in production.

4.4.1 Sample. The number of sample units comprising a sample of capacitors to be subjected to qualification inspection shall be as specified in table II or the appendix to this specification.

4.4.2 Inspection routine. The sample shall be subjected to the inspections specified in table II, in the order shown. All sample units shall be subjected to the inspections of group I. The sample shall then be divided as specified in table II for groups II and III and subjected to the inspection for their particular group.

ication - Between the strip of metallic foil and the capacitor (b) Points of appl

TABLE II. Qualification inspection.

Examination or test	Requirement paragraph	Method paragraph	Number of sample units to be tested	Number of failures permitted 1/
Group I				
Visual and mechanical inspection:		4.6.1		
Design, construction, and physical dimensions	3.1 and 3.4		2	1
Marking 2/ and workmanship	3.18 to 3.19.2 incl			
Dielectric withstanding voltage	3.5	4.6.2	26	1
Barometric pressure (reduced)	3.6	4.6.3	18	1
Insulation resistance	3.7	4.6.4		
Capacitance	3.8	4.6.5		
Dissipation factor	3.9	4.6.6		
Temperature coefficient and capacitance drift	3.10	4.6.7	6	1
Group II				
Terminal strength	3.11	4.6.8	12	1
Torque	3.12	4.6.9		
Fatigue	3.13	4.6.10		
Life	3.14	4.6.11		
Group III				
Shock, specified pulse	3.15	4.6.12	12	1
Vibration, high frequency	3.16	4.6.13		
Moisture resistance	3.17	4.6.14		

1/ A sample unit having one or more defects will be considered as one defective.
2/ Marking will be considered as a defect only if it becomes illegible as a result of any of the tests.

4.4.3 Failures. Failures in excess of those allowed in table II shall be cause for refusal to grant qualification.

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A, B, and C inspection.

4.5.1.1 Inspection lot. An inspection lot shall consist of capacitors of the same style and characteristic produced under essentially the same conditions, and offered for inspection at one time.

4.5.2 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table III, in the order shown.

4.5.2.1 Sampling plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105 for general inspection levels. The acceptable quality levels (AQL) shall be as specified in table III. Major and minor defects shall be as defined in MIL-STD-105. One hundred percent inspection shall be performed when lot sizes are such that MIL-STD-105 would waive testing.

TABLE III. Group A inspection.

Examination or test	Requirement paragraph	Method paragraph	AQL (percent) defective	
			Major	Minor
Group I				
Visual and mechanical inspection		4.6.1	1.0	4.0
Design, construction, and physical dimensions	3.1 and 3.4			
Marking 1/	3.18			
Workmanship	3.19 to 3.19.2 incl			
Subgroup 2				
Dielectric withstanding voltage	3.5	4.6.2	1.0	
Insulation resistance	3.7	4.6.4		
Capacitance	3.8	4.6.5		
Dissipation factor	3.9	4.6.6		

1/ Marking defects are considered major and are based on visual examination only.

4.5.3 Group B inspection. Group B inspection shall consist of the tests specified in table IV, in the order shown. Shipment of capacitor lots shall not be accomplished until representative samples of the lot have successfully completed the group B tests.

4.5.3.1 Sampling plan. The sampling plan shall be in accordance with MIL-STD-105 for special inspection levels. Unless otherwise specified herein, normal inspection levels shall be used at the start of the contract. The AQL shall be 2.5 (percent defective) and the inspection level shall be S-4. If the number of defectives exceeds the amount specified, the lot shall be rejected.

TABLE IV. Group B inspection.

Examination or test	Requirement paragraph	Method paragraph
Terminal strength	3.11	4.6.8
Torque	3.12	4.6.9
Temperature coefficient	3.10.1	4.6.7.1

4.5.3.2 Disposition of sample units. Sample units which have been subjected to group B inspection shall not be delivered on the contract or order.

4.5.3.3 Rejected lots. If an inspection lot is rejected, the supplier may withdraw the lot, rework it to correct the defects, or screen out the defectives, as applicable, and reinspect. Such lots shall be kept separate from new lots and shall be clearly identified as reinspected lots. Rejected lots shall be inspected using tightened inspection. Failure of a resubmitted lot due entirely to failure to pass the tests which caused a previous rejection shall be cause for final rejection.

4.5.4 Periodic inspection. Periodic inspection shall consist of group C inspection.

4.5.4.1 Group C inspection. Group C inspection shall consist of the tests specified in table V, in the order shown. Sample units shall be taken at random from capacitors currently in production. The number of sample units to be inspected shall be as specified in table V. Separate samples of the size required by table V shall be used for each sampling period and each subgroup listed. Defectives in excess of those allowed in table V shall constitute failure. Delivery of units is not to be delayed pending results of group C testing.

4.5.4.2 Sampling procedure. At the discretion of the Government, but not in excess of once each month, a sample consisting of 12 sample units of each style and characteristic shall be taken at random from capacitors currently in production. These specimens shall have passed all group A tests.

4.5.4.3 Test routine. Specimens chosen in accordance with 4.5.4.2 shall be subjected to the group C tests specified in table V. No more than one defective capacitor will be allowed for a single sample (12 sample units).

TABLE V. Group C inspection.

Examination or test	Requirement paragraph	Method paragraph	Number of sample units to be inspected	Number of defectives allowed
Subgroup 1 tests				
Fatigue Life	3.13 3.14	4.6.10 4.6.11	12	1
Subgroup 2 tests				
Barometric pressure (reduced)	3.6	4.6.3	18	1
Shock, specified pulse	3.15	4.6.12		
Vibration	3.16	4.6.13		
Moisture resistance	3.17	4.6.14		

4.5.4.4 Noncompliance. If a sample fails to pass group C inspection, the supplier shall take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials, processes, etc., and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspection, or the inspection which the original sample failed, at the option of the Government). Groups A and B inspection may be reinstituted; however, final acceptance shall be withheld until the group C reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and the corrective action taken shall be furnished to the contracting officer.

4.5.5 Retention of qualification. To retain qualification, the manufacturer shall forward at 6-month intervals, to the qualifying activity, a summary of the results of groups A and B tests, indicating as a minimum the number of lots which passed and the number which failed, and a summary of the results of group C tests, including the number and type of any part failure. The summary shall include those tests performed during the 6-month period. If the summary of the test results indicates nonconformance with specification requirements, action shall be taken to remove the failing product from the qualified products list. Failure to submit the summary shall result in loss of qualification for that product. In addition to the periodic submission of inspection data, the supplier shall immediately notify the qualifying activity at any time during the 6-month period that the inspection data indicates failure of the qualified product to meet the requirements of the specification.

4.5.6 Inspection of packaging. The sampling and inspection of the preservation, packing, and container marking shall be in accordance with the requirements of MIL-C-39028 (see 6.4).

4.6 Methods of inspection.

4.6.1 Visual and mechanical examination. Capacitors shall be examined to verify that the materials, design, construction, physical dimension, marking, and workmanship are in accordance with the applicable requirements (see 3.1, 3.3, 3.4, 3.18, and 3.19).

4.6.2 Dielectric withstanding voltage (see 3.5).

4.6.2.1 Terminal to terminal. Capacitors shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

a. Magnitude of test voltage - 2.2 times applicable rated dc voltage.

b. Duration of application of test voltage - 3 ±2 seconds.

c. Points of application of test voltage - Between terminals.

d. Limiting value of surge current - 50 milliamps.

4.6.2.2 Terminal to mounting. Capacitors shall be tested in accordance with 4.6.2.1 with the following exceptions:

a. Capacitors shall be mounted by normal mounting means on a metal plate and the terminals shall be electrically connected. (Resilient spacer referenced in 6.5 shall not be used for this test.)

b. In lieu of 4.6.2.1c use the following:
Points of application of test voltage - Between terminals and metal plate.

c. Style CV31 does not require this test.

4.6.3 Barometric pressure (reduced) (see 3.6). Capacitors shall be tested in accordance with method 105 of MIL-STD-202. The following details shall apply:

a. Mounting - Normal mounting means.

b. Test condition - D (100,000 ft), and when applicable (see 3.1), condition B (50,000 ft).

c. Tests during subjection to reduced pressure - Unless otherwise specified (see 3.1), a potential equal to the rated dc voltage shall be applied for not less than 3 ±2 seconds between the terminals of the capacitors.

lating the ripple current are based on operation at 120 Hz and 85 °C. For other frequencies or

4.6.4 Insulation resistance (see 3.7). Capacitors shall be tested in accordance with method 302 of MIL-STD-202. The following details shall apply:

a. Test condition - Rated voltage, but not to exceed 500 volts.

b. Special conditions - If failure occurs at a relative humidity above 60 percent, the insulation resistance may be measured again at a relative humidity of 50 ±5 percent.

c. Point of measurement - Terminal to terminal.

d. Electrification time - Shall not exceed 1 minute.

4.6.5 Capacitance (see 3.8). Capacitors shall be tested in accordance with method 305 of MIL-STD-202. The following details shall apply:

a. Test frequency - 1 MHz ±100 kHz.

b. Limit of accuracy - ±2 percent or 0.5 picofarad, whichever is greater.

4.6.6 Dissipation factor (see 3.9). The dissipation factor of capacitors shall be measured at both maximum and minimum capacitance setting at a frequency of 1 MHz ±100 kHz. The accuracy of measurement shall be within ±10 percent of the limit (see 3.9). The voltage applied shall be less than 30 volts peak.

4.6.7 Temperature coefficient and capacitance drift (see 3.10).

4.6.7.1 Temperature coefficient. Capacitance-change measurement at 80 to 90 percent of maximum rated capacitance setting shall be made at the temperature specified in table VI and at a frequency between 0.1 and 1.2 megaHertz. Each measurement shall be made after the capacitor has reached thermal stability. (Thermal stability has been reached when no further change in capacitance is obtained between two successive measurements taken at 5-minute intervals.)

TABLE VI. Capacitance-change measurements.

Sequence		Temperature
		°C ±2°C
Step 1	Start at	25
Step 2	Reduce to	-55
Step 3	Return to	25
Step 4	Raise to	85
Step 5	Return to	25

4.6.7.2 Capacitance drift. Calculation of capacitance drift shall be based on the maximum deviation between any two of the three measurements of capacitance at 25°C (see table VI).

4.6.8 Terminal strength (see 3.11). A 4-pound force shall be applied between each terminal and the base. The force shall be applied parallel to the terminal extension, and shall be increased gradually to 4 pounds and held at that value for not less than 10 seconds.

4.6.9 Torque (see 3.12). The torque required to start and maintain rotation of the rotor shall be measured by a gradually applied force sufficient to turn the rotor through at least one complete rotation.

4.6.10 Fatigue (see 3.13). Capacitance, at maximum capacitance setting, shall be measured as specified in 4.6.5. The rotors of the capacitors shall be continuously rotated through the complete range (360°) in alternating directions at a rate of approximately 20 cycles per minute for a period of 5 minutes. The driving mechanism used in this test shall include a flexible coupling to prevent development of excessive pressures caused by misalignment of the driving shaft and the shaft of the capacitor rotor. The capacitance, at maximum capacitance setting, and the torque shall be measured as specified in 4.6.5 and 4.6.9, respectively.

4.6.11 Life (see 3.14).

4.6.11.1 For qualification inspection. Capacitance shall be set at 80 to 90 percent of maximum capacitance and measured as specified in 4.6.5. A dc potential of 50 percent rated voltage upon which a peak alternating potential of 50 percent rated voltage at a frequency of 100 Hertz or less is superimposed, shall then be applied to the capacitors for 1,000 ±12 hours at a temperature of 85°C ±2°C. Upon completion of the test, capacitors shall be returned to standard test conditions without disturbing the initial capacitance setting. Insulation resistance and capacitance shall be measured as specified in 4.6.4 and 4.6.5, respectively.

4.6.11.2 For quality conformance inspection. The life test shall be conducted as specified in 4.6.11.1.

4.6.12 Shock, specified pulse (see 3.15). Capacitors shall be tested in accordance with method 213 of MIL-STD-202. The following details and exceptions shall apply:

a. Special mounting means - Capacitors shall be rigidly mounted on a mounting fixture by the normal mounting means.

b. Number and direction of applied shocks - Thirty shocks, 10 blows in each of 3 mutually perpendicular planes (5 in each of 2 directions). The test planes shall be perpendicular to the normal mounting axis, perpendicular to the mounting axis with the capacitor body rotated 90°, and parallel to the mounting axis.

c. Test-condition letter - I.

d. Electrical-load conditions - During the test, a potential of 125 percent of the rated dc voltage (see 3.1) shall be applied between the terminals of the capacitor.

e. Measurements during shock - During the test, observations shall be made to determine intermittent contacts of 0.5 millisecond (ms) or greater duration or arcing or other indication of any open or short circuiting or evidence of mechanical damage.

f. Examinations after test - Capacitors shall be visually examined for evidence of breakdown, arcing, and mechanical damage.

4.6.13 Vibration, high frequency (see 3.16). Capacitors shall be tested in accordance with method 204 of MIL-STD-202. The following details and exception shall apply:

a. Mounting of specimens - Capacitors shall be mounted as specified in 4.6.12a. The mounting fixture shall be so constructed as to preclude any resonances within the test range. An examination of the mounting fixture shall be made on a vibrator. If any resonant frequencies are observed, adequate steps must be taken to damp the structure.

b. Electrical-load conditions - As specified in 4.6.12d.

c. Test condition letter - B.

d. Measurements during vibration - During the last cycle in each direction, an electrical measurement shall be made to determine intermittent contacts of 0.5 ms or greater duration or open or short circuiting.

e. Examination after vibration - Capacitors shall be visually examined for evidence of mechanical damage.

f. Final measurements - After the final vibration cycle, the initial capacitance setting shall not be disturbed. Dielectric withstanding voltage, capacitance, and dissipation factor shall be measured as specified in 4.6.2, 4.6.5, and 4.6.6, respectively.

4.6.14 Moisture resistance (see 3.17). Capacitors shall be tested in accordance with method 106 of MIL-STD-202. The following details shall apply:

a. Mounting - Securely fastened by normal mounting means.

b. Initial measurements - Capacitance shall be set at 80 to 90 percent of maximum rated capacitance and measured as specified in 4.6.5. Capacitance measurements shall be made not less than 1 hour nor more than 4 hours before test initiation.

c. Polarization and load - Not applicable.

d. Final measurements - After the final cycle, the initial capacitance setting shall not be disturbed. Insulation resistance, dissipation factor, and capacitance shall be measured as specified in 4.6.4, 4.6.5, and 4.6.6, respectively.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-C-39028.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Capacitors covered by this specification are not intended for temperature-compensating purposes; nor should they be installed in circuits where periodic adjustment is objectionable. Users of these capacitors and designers should recognize the limits of capacitance stability as specified in 3.10, 3.13, 3.14, 3.16, and 3.17.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of the specificiation.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

c. Title, number, and date of the applicable specification sheet, and the complete type designation (see 1.2.1 and 3.1).

d. Levels of preservation and packaging and packing (see section 5).

e. Applicable marking (see section 5).

f. Whether rough handling tests are required (see section 5).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract qualified for inclusion in Qualified Products List QPL No. 81 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the 2750 ABW/ES; however, information pertaining to qualification of products may be obtained from the Defense Electronics Supply Center (DESC-E), 1507 Wilmington Pike, Dayton, OH 45444-5000.

6.4 Indirect shipments. The preservation, packaging, packing, and marking requirements apply only to direct purchases by or direct shipment to the Government and are not intended to apply to contracts or orders between the supplier and the prime contractor.

6.5 Mounting. It is recommended that a resilient spacer between the unit and mounting surface be used to avoid possible cracking or chipping of the ceramic mounting base.

6.6 Identification of maximum capacitance. For styles CV11, CV14, CV21, and CV34, the approximate maximum capacitance value is obtained by rotating the plated area of the disk (rotor) until it coincides as nearly as possible with the area of the solder button terminal of the stator.

6.7 Subject term (key word) listing.

Capacitance
Dissipation factor

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

APPENDIX

PROCEDURE FOR QUALIFICATION APPROVAL

10. SCOPE

10.1 Scope. This appendix details the procedure for submission of samples, with related data, for qualification inspection of capacitors covered by this specification. The procedure for extending qualification of the required sample to other capacitors covered by this specification is also outlined herein. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

20. APPLICABLE DOCUMENTS. This section is not applicable to this appendix.

30. SUBMISSION

30.1 Sample.

30.1.1 Single-type submission. A sample consisting of 25 sample units of the style and characteristic for which qualification is sought shall be submitted. These sample units shall be of the highest capacitance value in the characteristic for which qualification is sought.

30.1.2 Single-style submission. A sample consisting of the required number of sample units, or as specified in table VII, shall be submitted.

30.2 Test data. Each submission shall be accompanied by test data covering the nondestructive tests listed in table II which have been performed on the submitted sample units. The performance of the destructive tests by the supplier on a duplicate set of sample units is encouraged. All test data shall be submitted in duplicate.

TABLE VII. Samples of single style submission.

Style	Number of sample units	Type designation
CV11	13	CV11A070
	13	CV11D450
CV14	13	CV14A070
	13	CV14D450
CV21	13	CV21A070
	13	CV21D450
CV31	13	CV31A080
	13	CV31E600
CV34	13	CV34A080
	13	CV34E600
CV42	13	CV42X070
	13	CV42Z300

TABLE VII. Samples of single style submission - Continued.

Style	Number of sample unit	Type designation
CV98	13	CV98F2R5
	13	CV98K200
CV99	13	CV99L4R5
	13	CV99Q500
CV97	13	CV97R250
	13	CV97Q500
CV50	13	CV50X060
	13	CV50V300

40. EXTENT OF APPROVAL

40.1 Single-type approval. Approval of voltage will be restricted to that submitted. Approval of capacitance values will be restricted to values equal to and less than the capacitance value in the characteristic submitted. Approval of additional items will be granted provided that the manufacturer submits with his sample a statement to the effect that the mechanical construction of the rotor assembly, the dielectric material, and the impregnant do not differ from those of the characteristic approved.

40.2 Single-style approval. Approval of the submission shown in table VII will be the basis for approval of intermediate capacitance values, voltages, and characteristics in the style, provided the manufacturer submits with his sample a statement to the effect that the mechanical construction of the rotor assembly, and the impregnant do not differ from the style approved.

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 85

Review activities:
Army - MI
Air Force - 11, 99
DLA - ES

User activities:
Army - AR, AT
Navy - MC
Air Force - 19

Preparing activity:
Air Force - 85

Agent:
DLA - ES

(Project 5910-1684)